Released Form

Student Booklet

Student Name: _____

Spring 2013
North Carolina
Measures of Student Learning:
NC's Common Exams

Common Core Algebra II

READY

Public Schools of North Carolina
State Board of Education
Department of Public Instruction
Raleigh, North Carolina 27699-6314

1 Which expression is equivalent to $(3x^5 + 17x^3 - 1) + (^-2x^5 - 6)$?

A $x^5 + 17x^3 - 7$

B $x^5 - 11x^3 - 1$

C $5x^5 + 17x^3 + 7$

D $^-6x^5 + 17x^3 + 6$

2 Suppose $p(x) = x^3 - 2x^2 + 13x + k$. The remainder of the division of $p(x)$ by $(x + 1)$ is $^-8$. What is the remainder of the division of $p(x)$ by $(x - 1)$?

A $^-8$

B 8

C 16

D 20

3 What is the solution to the equation below?

$$\frac{\frac{3}{x} + 2}{\frac{x}{5} + 1} = \frac{15}{x}$$

A $^-12$

B $^-2$

C 2

D 12

4 A circular pond is modeled by the equation $x^2 + y^2 = 225$. A bridge over the pond is modeled by a segment of the equation $x - 7y = {}^-75$. What are the coordinates of the points where the bridge meets the edge of the pond?

A $(9, 12)$ and $({}^-12, 9)$

B $(9, 12)$ and $(12, 9)$

C $(9, {}^-12)$ and $({}^-12, {}^-9)$

D $({}^-9, 12)$ and $(12, {}^-9)$

5 A system of equations is shown below.

$$y = |x - 3|$$

$$y = \frac{1}{2}x$$

What is the distance between the points of intersection of the system?

A $\sqrt{6}$

B $\sqrt{20}$

C $\sqrt{48}$

D $\sqrt{80}$

6 Which is the solution set for x if $2e^{2x} + 5e^{x} - 12 = 0$?

A $\left\{\ln\frac{3}{2}, \ln 4\right\}$

B $\left\{\ln\frac{3}{2}, \ln^{-}4\right\}$

C $\{\ln 4\}$

D $\left\{\ln\frac{3}{2}\right\}$

7 Samantha invested $10,000 in each of two different financial plans in 2013. The predicted value of each plan is modeled below.

- Plan M: a rate of 7.5%, compounded continuously.
- Plan N: The value is determined by the function $y = 5x^3 - 50x^2 + 4x + 10{,}000$, where x is the number of years after 2013.

Plan N has a greater predicted value than Plan M during which years?

A from 2014 to 2041

B from 2028 to 2055

C from 2042 to 2073

D Plan N never has a greater value than Plan M.

Go to the next page.

8 A student wants to determine the most liked professor at her college. Which type of study would be the ***most*** practical to obtain this information?

A a simulation

B an experiment

C a survey

D an observation

9 A principal wants to survey 150 students to determine which electives to offer during the next school year. There are 1,800 students in the school. Which procedure could the principal use to select a sample using a systematic random sample?

A Obtain a list of all students. Start with the eighth student, and select every twelfth student until 150 students have been selected.

B Select the first 150 students who enter the school.

C Choose the fifth student to come into the cafeteria, and then select every third student who comes into the cafeteria until 150 students have been selected.

D Place students' names on slips of paper and select 150 slips.

10 What is the value of x if $\frac{h+5}{x} - 3 = 12$?

A $x = \frac{h}{10}$

B $x = \frac{h}{3}$

C $x = \frac{h}{3} + \frac{1}{3}$

D $x = \frac{h}{15} + \frac{1}{3}$

Go to the next page.

11 Fred drives an average of 15,000 miles per year, and his car gets 20 miles per gallon of gasoline.

- The average cost of gasoline is $3.25 per gallon.
- He buys a new car.
- In his new car, Fred continues to average 15,000 miles per year, and the average cost of gasoline remains the same.

Approximately how many more miles per gallon does the new car get if Fred has a savings of $650 per year on gasoline?

A 5.8 mpg

B 7.3 mpg

C 8.8 mpg

D 10.3 mpg

12 What value of h is needed to complete the square for the equation $x^2 + 10x - 8 = (x - h)^2 - 33$?

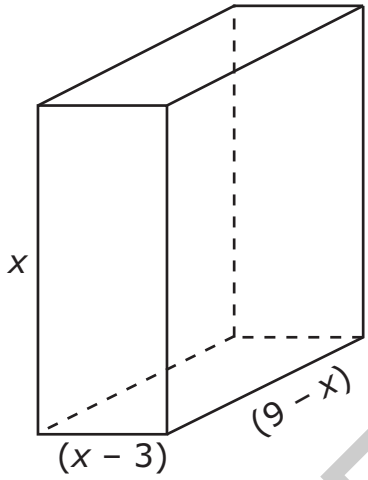
A $^{-}25$

B $^{-}5$

C 5

D 25

13 A right rectangular prism is shown below.



What is the domain for the volume function of the prism?

A $0 < x < 9$

B $0 < x < 3$

C $3 < x < 9$

D $6 < x < 9$

14 A town has 685 households. The number of people per household is normally distributed with a mean, μ, of 3.67 and a standard deviation, σ, of 0.34. ***Approximately*** how many households have between 2.99 and 4.01 people?

A 493 households

B 520 households

C 558 households

D 575 households

15 The scores on a recent test are normally distributed. John's test score of 69 was 1 standard deviation below the mean. Betty's test score of 99 was 3 standard deviations above the mean. What are the mean and standard deviation for the test score distribution?

A The mean is 76.5, and the standard deviation is 7.5.

B The mean is 79, and the standard deviation is 10.

C The mean is 84, and the standard deviation is 15.

D The mean is 91, and the standard deviation is 2.5.

16 Which expression is equivalent to $\frac{\cos(\theta)}{1 - \sin(\theta)} - \tan(\theta)$?

A $\sec(\theta)$

B $\sin(\theta)$

C $\cos(\theta)$

D $\csc(\theta)$

17 William put the tip of his pencil on the outer edge of a graph of the unit circle at the point $(0, -1)$. He moved his pencil tip through an angle of $\frac{4\pi}{3}$ radians in the counterclockwise direction along the edge of the circle. At what angle of the unit circle did William's pencil tip stop?

A $\frac{\pi}{3}$

B $\frac{5\pi}{6}$

C $\frac{7\pi}{6}$

D $\frac{5\pi}{3}$

18 Which is the inverse of $f(x) = 1.5^x + 4$?

A $f^{-1}(x) = \frac{x - 4}{1.5}$

B $f^{-1}(x) = \frac{\log(x) - 4}{1.5}$

C $f^{-1}(x) = \frac{\log(x - 4)}{\log(1.5)}$

D $f^{-1}(x) = \frac{4 - \log(x)}{\log(1.5)}$

19 The recursive formula for a sequence is $U_n = U_{n-1} + 12$, where U_n is the nth term of the sequence and $U_0 = 7$. Which explicit formula can be used to determine the nth term of the sequence?

A $7n + 19$

B $7n + 12$

C $7 + 19n$

D $7 + 12n$

20 If $x^2 - 6x - 16$ is written in the form $a(x - h)^2 + k$, what is the value of $a + h + k$?

A $^{-}27$

B $^{-}21$

C 12

D 29

21 The volume of a rectangular prism is represented by the expression $(x^3 - 2x^2 - 20x - 24)$. If the length is $(x - 6)$ and the height and width are equal, what is the width of the prism?

A $x + 2$

B $x - 2$

C $x + 4$

D $x - 4$

Go to the next page.

22 Which expression is equivalent to $\left(\frac{16x^{\frac{1}{6}}y^{-2}}{x^{-\frac{1}{6}}y^{6}}\right)^{\frac{3}{2}}$?

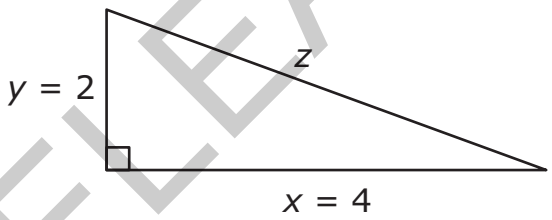
A $24x^{\frac{9}{2}}y^{\frac{9}{2}}$

B $\frac{24x^{\frac{3}{4}}}{y^{9}}$

C $\frac{64}{x^{\frac{1}{2}}y^{8}}$

D $\frac{64x^{\frac{1}{2}}}{y^{12}}$

23 A right triangle is shown below.



Which expression would result in an irrational number?

A $x^2 + y^2$

B $\frac{1}{2}xy$

C $x + y + z$

D $x^2 - z^2$

24 Which expression is equivalent to $(4 - 3i)^2 + (6 + i)^2$?

A 30

B $42 - 12i$

C 50

D $62 - 12i$

25 What is the value of the expression $q^2 + r^2$, if q and r are distinct solutions of the equation $x^2 - 14x + 74 = 0$?

A 98

B 88

C 60

D 48

This is the end of the multiple-choice portion of the test.

The questions you read next will require you to answer in writing.

1. **Write your answers on separate paper.**
2. **Be sure to write your name on each page.**

1 Cindy purchased 100 bricks. Each brick is within $\frac{1}{8}$ inch of the advertised length of 8 inches. Cindy will line the bricks up end to end, with no space between them, to build a straight line path.

- Write a single inequality that can be used to find the possible lengths of the path.
- What is the minimum length of the path?
- What is the maximum length of the path?

2 An equation is shown below.

$$\sqrt{x + 2} + 4 = x$$

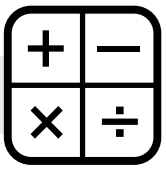
- Determine the smallest possible solution for the equation.
- Determine the largest possible solution for the equation.
- Determine if any of the solutions are extraneous. Explain.

3 A piecewise function is shown below.

$$f(x) = \begin{cases} |x + 4| & \text{for } {}^{-}5 \le x < {}^{-}1 \\ x^3 - 4x & \text{for } {}^{-}1 \le x \le 3 \\ \sqrt{x - 2} & \text{for } 3 < x \le 5 \end{cases}$$

- Graph the piecewise function $f(x)$.
- For what values of x is $f(x)$ continuous?
- What are the minimum and maximum values of $f(x)$?

Go to the next page.



This is the end of the Common Core Algebra II test.

1. **Look back over your answers.**
2. **Put all of your papers inside your test book and close the test book.**
3. **Place your calculator on top of the test book.**
4. **Stay quietly in your seat until your teacher tells you that testing is finished.**

Common Core Algebra II
RELEASED Form
Spring 2013
Answer Key

Item number	Type	Key	Conceptual Category
1	MC	A	A — Algebra
2	MC	D	A — Algebra
3	MC	A	A — Algebra
4	MC	A	A — Algebra
5	MC	B	A — Algebra
6	MC	D	F — Function
7	MC	C	F — Function
8	MC	C	S — Statistics and Probability
9	MC	A	S — Statistics and Probability
10	MC	D	A — Algebra
11	MC	B	A — Algebra
12	MC	B	F — Function
13	MC	C	F — Function
14	MC	C	S — Statistics and Probability
15	MC	A	S — Statistics and Probability
16	MC	A	F — Function
17	MC	B	F — Function
18	MC	C	F — Function
19	MC	D	F — Function
20	MC	B	A — Algebra
21	MC	A	A — Algebra
22	MC	D	N — Number and Quantity
23	MC	C	N — Number and Quantity

Item number	Type	Key	Conceptual Category
24	MC	B	N — Number and Quantity
25	MC	D	N — Number and Quantity
26	CR	Rubric	A — Algebra
27	CR	Rubric	A — Algebra
28	CR	Rubric	F — Function

Item Types:
MC = multiple choice
CR = constructed response